CampbellReith
consulting engineers

7 Greville Place
London NW6 5JP

Basement Impact Assessment Audit

For

London Borough of Camden

Project Number: 12336-63
Revision: F1

January 2017

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Document History and Status

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D2	12/08/16	Comment	NAjap-12336-63-120816-7 Greville Place-D2.doc	N Aalabaf	F G Acheson	E Brown
F1	27/01/17	For Planning	NAjap-12336-63-270117-7 Greville Place-F1.doc	N Aalabaf	F G Acheson	G Kite

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Project Number	12336-63
Project Name	7 Greville Place
Planning Reference	2016/1489/P

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Appendix

1.0 NON-TECHNICAL SUMMARY

1.1. CampbellReith was instructed by London Borough of Camden, (LBC) to carry out an audit on the Basement Impact Assessment submitted as part of the Planning Submission documentation for 7 Greville Place, London, NW6 5JP (planning reference 2016/1489/P). The basement is considered to fall within Category B as defined by the Terms of Reference.

1.2. The Audit reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basement development in accordance with LBC's policies and technical procedures.

1.3. CampbellReith was able to access LBC's Planning Portal and gain access to the latest revision of submitted documentation and reviewed it against an agreed audit check list.

1.4. The Basement Impact Assessment (BIA), Geotechnical Desk Study and Ground Investigation have been carried out by Jomas Associates Ltd and a Structural Feasibility Report (SFR) was prepared by Halstead Associates.

1.5. The initial Basement Impact Assessment (BIA) raised a number of queries relating to BIA format, hydrology and stability of the proposed structure and neighbouring property. Further to the submission of CampbellReith's initial and second BIA audit report, supplementary information was provided in response to the queries raised. The current report takes account of that information and updates the BIA audit.

1.6. The qualifications of the author of the BIA did not comply with the requirements of CPG4. However, whilst CPG4 requires the input of a CEng from a member of the Engineering Council, C.WEM or a CEng MICE with respect to surface flow and flooding, it is considered that the BIA has appropriately addressed this issue.

1.7. The BIA confirmed the basement is to be founded within the London Clay and the water table is considered to be perched water. Sump pumping is proposed to deal with the anticipated perched water inflows.

1.8. It is understood that a wine cellar is no longer required and therefore is omitted from the application.

1.9. A description of temporary works during construction and a construction sequence have now been provided.

1.10. No information was presented with respect to adjacent property foundations and presence or absence of adjacent buildings and this was requested. The response received has now

confirmed conservative foundation depths for the purposes of outline assessment. In addition, the nearby foundations will be investigated as part of the Party Wall Agreement.

1.11. Estimates of horizontal and vertical movements from the underpinning, excavation and heave were requested and have now been provided.

1.12. The anticipated damage impact is assessed as Category 0 (Negligible) to the neighbouring properties. The calculated movements and damage assessment are broadly in accordance with CIRIA C580 and are accepted.

1.13. A movement monitoring strategy during excavation and construction has now been provided in section 6.00 and 8.00 of the Structural Feasibility Report dated August 2016. Trigger values should be linked to the predicted movements and it is accepted that this will be updated and agreed during the Party Wall process.

1.14. The information provided with respect to hydrogeology is considered to be sufficient and it is accepted that there are no potential impacts to groundwater flow from the proposed development.

1.15. It is accepted that the site is not at risk of surface water flooding and there are no hydrological concerns with respect to the proposed development.

1.16. An outline works programme has now been provided as requested. A detailed programme should be submitted by the appointed contractor at a later date.

1.17. Queries and issues for clarification were raised in previous audit reports which have since been resolved as discussed in section 4 and summarised in Appendix 2. It is accepted that the BIA and supporting documents adequately identify the potential impacts arising out of the basement proposals and describe suitable mitigation.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 19 May 2016 to carry out a Category B Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 7 Greville Place, London NW6 5JP, Camden Reference 2016/1489/P.

2.2. The Audit was carried out in accordance with the Terms of Reference set by LBC. It reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basement development.

2.3. A BIA is required for all planning applications with basements in Camden in general accordance with policies and technical procedures contained within

- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.
- Camden Planning Guidance (CPG) 4: Basements and Lightwells.
- Camden Development Policy (DP) 27: Basements and Lightwells.
- Camden Development Policy (DP) 23: Water.

2.4. The BIA should demonstrate that schemes:

a) maintain the structural stability of the building and neighbouring properties;

b) avoid adversely affecting drainage and run off or causing other damage to the water environment;

c) avoid cumulative impacts upon structural stability or the water environment in the local area, and;

evaluate the impacts of the proposed basement considering the issues of hydrology, hydrogeology and land stability via the process described by the GSD and to make recommendations for the detailed design.

2.5. LBC's Audit Instruction described the planning proposal as *"extension to the existing basement with it extending outwards beneath the existing drive."*

2.6. CampbellReith accessed LBC's Planning Portal on 20 May 2016 and gained access to the following relevant documents for audit purposes:

· Basement Impact Assessment Report (BIA)

- Structural Feasibility Report (SFR)
- Planning Application Drawings consisting of

  Location Plan

  Existing Plans

  Proposed Plans
- Design & Access Statement

2.7. Following the initial audit, supplementary information has been provided on 25th July 2016 by email. The documents provided are as follows:

- Outline programme
- Suggested constructions sequence drawing
- Proposed plans
- Drainage plans
- BIA queries responses

2.8. Supplementary information was again provided in August 2016 and January 2017 by email. The documents provided are as follows:

- Proposed Site Plan, APL-10, Rev 01, 19th August 2016
- Proposed Distance Section, APL-305, Rev 00, 18th July 2016
- Query Responses
- Structural Feasibility Report, Ref: 16497/DO/mf, August 2016
- Ground Movement Assessment and Predicted Damage Category Calculations, Ref: 16497, January 2017

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	Yes	See Audit paragraph 4.2.
Is data required by Cl.233 of the GSD presented?	Yes	
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	Yes	See Audit paragraph 4.9.
Are suitable plan/maps included?	Yes	
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	Yes	
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	See Audit paragraph 4.6.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	See Audit paragraphs 4.7.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	Yes	See Audit paragraph 4.8.
Is a conceptual model presented?	Yes	BIA section 8.1 and 8.2.
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	No	See Audit paragraph 4.6.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	Yes	
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	N/A	No issues identified from screening.
Is factual ground investigation data provided?	Yes	GIR section 8.0 and Appendix 8.0.
Is monitoring data presented?	Yes	GIR section 8.2.2.
Is the ground investigation informed by a desk study?	Yes	
Has a site walkover been undertaken?	Yes	BIA section 2.2.
Is the presence/absence of adjacent or nearby basements confirmed?	Yes	
Is a geotechnical interpretation presented?	Yes	GIR section 13.2. Although this is considered incomplete. No information on retaining wall design parameters.
Does the geotechnical interpretation include information on retaining wall design?	Yes	Provided in revised submissions.
Are reports on other investigations required by screening and scoping presented?	N/A	None identified.
Are the baseline conditions described, based on the GSD?	Yes	Provided in revised submissions.
Do the base line conditions consider adjacent or nearby basements?	No	Shallow foundations have been assumed for the purposes of assessment.

Item	Yes/No/NA	Comment
Is an Impact Assessment provided?	Yes	Provided in revised submissions.
Are estimates of ground movement and structural impact presented?	Yes	Estimates of ground movement and structural impact presented. See Audit paragraph 4.11 and 4.12.
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	Yes	Provided in revised submissions.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	Yes	Provided in revised submissions.
Has the need for monitoring during construction been considered?	Yes	To be updated and agreed under the Party Wall Act
Have the residual (after mitigation) impacts been clearly identified?	N/A	No such issues identified.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	Yes	Provided in revised submissions.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	Yes	
Does report state that damage to surrounding buildings will be no worse than Burland Category 2?	Yes	Provided in revised submissions.
Are non-technical summaries provided?	Yes	Provided.

4.0 DISCUSSION

4.1. The initial Basement Impact Assessment (BIA) raised a number of queries relating to BIA format, hydrology and stability of the proposed structure and neighbouring property. Further to the submission of CampbellReith's initial BIA audit report, supplementary information was provided in response to the queries raised. The current report takes account of the information and updates the BIA audit.

4.2. The qualifications of the author of the BIA did not comply with the requirements of CPG4. The BIA has been reviewed by a Chartered Geologist and whilst CPG4 requires the input of a CEng from a member of the Engineering Council, C.WEM or a CEng MICE with respect to surface flow and flooding, it is considered that the BIA has appropriately addressed this issue.

4.3. A Structural Feasibility Report was prepared by Halstead Associates and the author is a Chartered Engineer.

4.4. The existing building is a two storey semi-detached house with a basement under the footprint of the building, a garden at the back and a driveway at the front of the property. It is proposed to extend the existing basement toward the front of the property beneath the driveway.

4.5. The Architect's drawing indicated a new wine cellar excavated beneath the existing basement. The response received to query no. 2 of the Audit query notes that the wine cellar is no longer required and therefore is omitted from the application.

4.6. No information was originally presented in the BIA or in any other document with respect to adjacent property foundations. The response received to query no. 5 of the Audit query states that 'there will be no scope for establishing the precise depth of the foundations to the adjacent properties unless the neighbours grant access to carry out trial pit investigation'. The response also states that there are no basements in the adjacent properties and the proposed basement foundations will not noticeably increase the differential depth. However, this is contradictory. Increasing the depth of a foundation adjacent to properties with no basements will increase the differential depth. This has now been addressed (see 4.12).

4.7. Clarification was requested on the risk of shrink-swell and has now been provided. Whilst the geology comprises London Clay, there are no significant trees in the vicinity of the proposed works. It is understood that the risk of shrink-swell is not considered to have a significant effect on the proposed basement.

4.8. Clarification was requested on the proposed site drainage and whether or not surface water runoff will be infiltrated into the ground. The supplementary information has now been provided.

It is understood that surface water runoff from the site will be discharge into the existing network and no additional surface water will be discharged into the ground.

4.9. The proposed basement is to be formed by underpinning. It is stated that the construction of the walls of the new basement extension will involve "carrying out local excavations of around 1m in width and down to the formation level of the new basement". A description of temporary works during construction and construction sequence was requested and has now been provided.

4.10. Cl. 234 of the Arup GSD states that it is the applicant's responsibility to provide sufficient information proportionate to the potential impacts of the proposed basement. A thorough screening process with the requirements of CPG4 accurately followed needs to be completed with clear justification to the 'No' responses to demonstrate there are no potential impacts from the proposal. This has now been provided.

4.11. Estimates of horizontal and vertical movements from the underpinning, excavation and heave movements from the excavation were requested and have now been provided.

4.12. No information was presented with respect to adjacent property foundations and presence or absence of adjacent buildings and this was requested. For the purposes of outline assessment, conservatively shallow foundation depths have been assumed. In addition, the nearby foundations will be investigated as part of the Party Wall Agreement.

4.13. The anticipated damage impact is assessed as Category 0 (Negligible) to the neighbouring properties. The calculated movements and damage assessment are broadly in accordance with CIRIA C580 and are accepted.

4.14. The structural impact to the public highway has now been considered. It is understood that no impact is expected on the public highway.

4.15. A movement monitoring strategy during excavation and construction has now been provided in section 6.00 and 8.00 of the Structural Feasibility Report dated August 2016. Trigger values should be linked to the predicted movements and it is accepted that this will be updated and agreed during the Party Wall process.

4.16. An outline works programme has now been provided as requested. A detailed programme should be submitted by the appointed contractor at a later date.

5.0 CONCLUSIONS

5.1. Further to the submission of CampbellReith's initial BIA audit reports, supplementary information was provided in response to the queries raised. The current report takes account of that information and updates the BIA audit.

5.2. The qualifications of the author of the BIA did not comply with the requirements of CPG4. Whilst CPG4 requires the input of a CEng from a member of the Engineering Council, C.WEM or a CEng MICE with respect to surface flow and flooding, it is considered that the BIA has appropriately addressed this issue.

5.3. It is accepted that there are no hydrological, hydrogeological or land stability impacts due to slopes.

5.4. The anticipated damage impact is assessed as Category 0 (Negligible) to the neighbouring properties. The calculated movements and damage assessment are broadly in accordance with CIRIA C580 and are accepted.

5.5. The structural impact to the public highway has now been considered. It is understood that no impact is expected on the public highway.

5.6. A movement monitoring strategy during excavation and construction has now been provided in section 6.00 and 8.00 of the Structural Feasibility Report dated August 2016. Trigger values should be linked to the predicted movements and it is accepted that this will be updated and agreed during the Party Wall process.

5.7. Queries and results for clarification or more information were raised in previous audit reports which have since been resolved as discussed in section 4 and summarised in Appendix 2. It is accepted that the BIA and supporting documents adequately identify the potential impacts arising out of the basement proposals and describe suitable mitigation.

Appendix 1: Residents' Consultation Comment

None

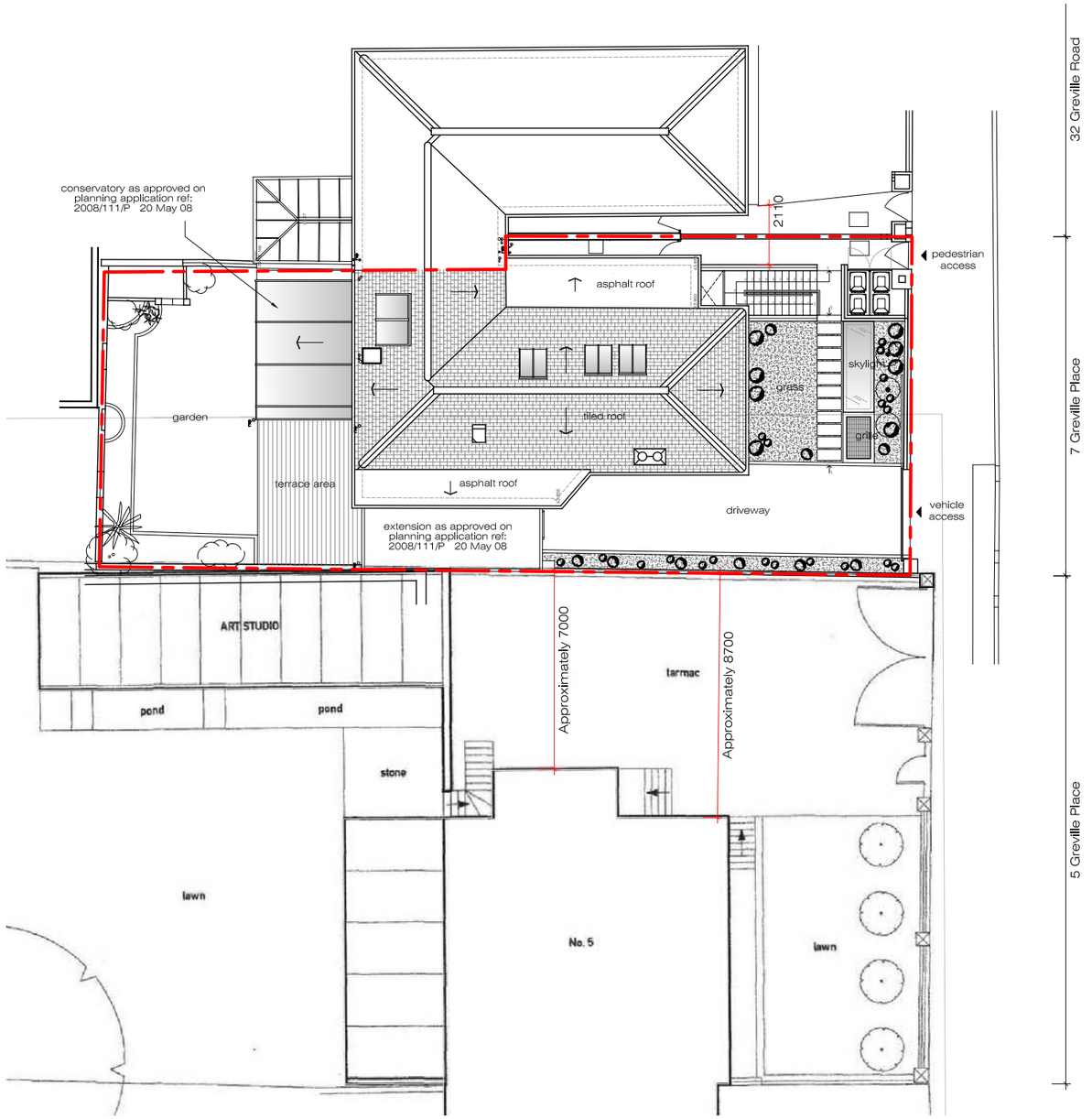
Appendix 2: Audit Query Tracker

CampbellReith
consulting engineers

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA format	Qualifications of individuals involved not in accordance with CPG4 requirements.	Closed	10.08.16
2	BIA format	Proposal not sufficiently detailed.	Closed	10.08.16
3	BIA format	Works programme not provided	Closed	10.08.16
4	Hydrology	Clarification requested on the proposed site drainage	Closed	10.08.16
5	Stability	Neighbouring property foundations not determined and the response provided is contradictory (see Audit paragraph 4.6 and 4.12).	Closed	11.11.16
6	Stability	Clarification is requested on the risk of shrink-swell	Closed	10.08.16
7	Stability	No estimates of ground movement and structural impact presented (see Audit paragraph 4.11)	Closed	19.01.2017
8	Stability	No temporary works proposal provided	Closed	10.08.16
9	Stability	Damage category for neighbouring properties not provided (see Audit paragraph 4.12)	Closed	19.01.2017
10	Stability	Movement monitoring proposal not provided (see Audit paragraph 4.14).	Open- Outline proposal to be provided. Details and trigger levels to be agreed as part of Party Wall awards.	Ongoing – to be agreed under Party Wall Act

Appendix 3: Supplementary Supporting Documents



01 Site Plan

scale: 1:200 15_06

0m 5m 10m 15m 20m 30m

1:200

PLEASE NOTE:

1. All dimensions to be checked on site before fabrication.
2. Contractor to refer to engineers drawings before proceeding with works.
3. All drawings and designs are covered by design right (intelectual property), and may not be distributed, copied or issue without written permission of the architect.
4. All design concepts are the sole property of the architect and no adaptations, reproductions or copies may be made without written permission of the architect.
5. These drawings are subject to any variation required or recommendation by any statutory authority, or for the better carrying out of the works.
6. Samples to be provided by contractor for the architect approval.
7. All finishes to architect satisfaction.
8. All drawings to be approved by the architect before construction.

ADDITIONAL NOTES:

Rev	Issued for	Date	By	Issued	Rev	Issued for	Date	By	Issued

Client: PRIVATE CLIENT

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Project: 7 Greville Place
London, NW6 5JP

Title: Proposed Site Plan

Status: Planning Application

Scale	Drawn	Issued	Date
1:200 @ A3	JL	JL	19-Aug-16

Drawing No: APL-101

Project No: 15_08

Revision: 01

01 Distances to Neighbours

scale: 1:100 15_06

0m 1m 2m 3m 4m 5m

1:100

PLEASE NOTE:

1. All dimensions to be checked on site before fabrication.
2. Contractor to refer to engineers drawings before proceeding with works.
3. All drawings and designs are covered by design right (intelectual property), and may not be distributed, copied or issue without written permission of the architect.
4. All design concepts are the sole property of the architect and no adaptations, reproductions or copies may be made without written permission of the architect.
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7. All finishes to architect satisfaction.
8. All drawings to be approved by the architect before construction.

ADDITIONAL NOTES:

Rev.	Issued for:	Date	By:	Issued	Rev.	Issued for:	Date	By	Issued

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Project
7 Greville Place
London, NW6 5JP

Title
Proposed
Distances Section

Status
Planning Application

Scale	Drawn	Issued	Date
1:100 @ A3	JL	JL	18-Jul-16

Drawing No
APL-305

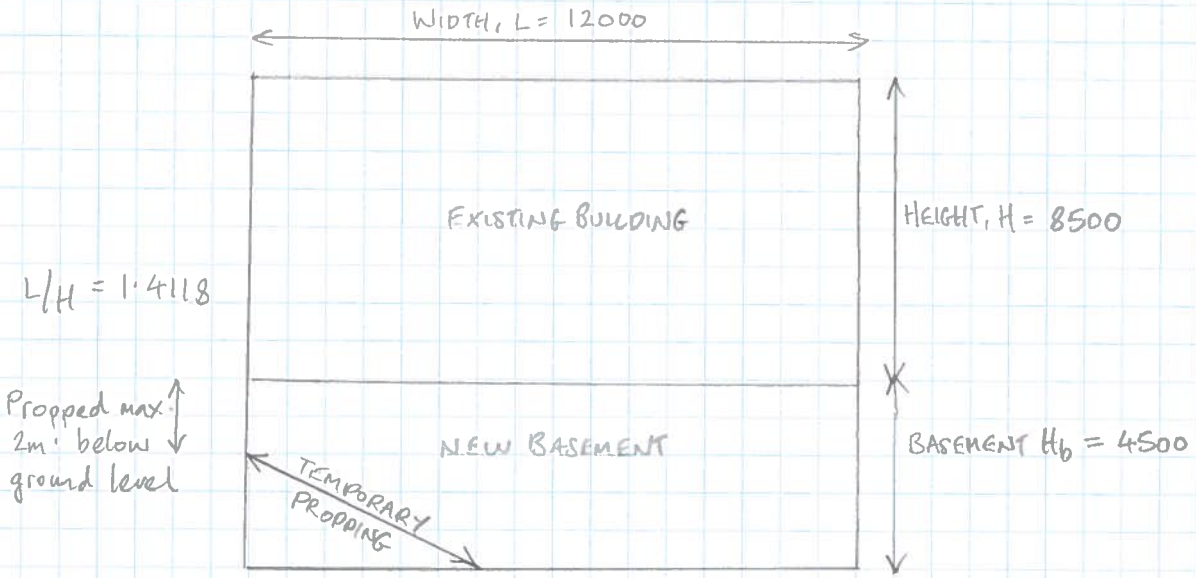
Project No
15_08

Revision
00

halstead ASSOCIATES CALCULATION SHEET REF: 16497 1

PROJECT: 7 GREVILLE PLACE, NW6 5JP ENGINEER: J.E REVISION:

ELEMENT: GROUND MOVEMENT ASSESSMENT & PREDICTED DAMAGE CATAGORY DATE: SEP'16 CHECKED:



HORIZONTAL MOVEMENT ASSESSMENT CIRIA C580 : EMBEDDED RETAINING WALLS

POTENTIAL MOVEMENT DUE TO WALL INSTALLATION

Horizontal surface movement = 0.05% (Table 2.2, Page 50)

Delta H = 0.05% x 4500 = 2.25mm

Vertical surface movement = 0.05%

Delta V = 0.05% x 4500 = 2.25mm

Lh = 4500 x 1.5 = 6750mm (Distance behind wall to negligible movement).

POTENTIAL MOVEMENT DUE TO WALL EXCAVATION

Horizontal surface movement = 0.15% (Table 2.4, Page 54)

Delta H = 0.15% x 4500 = 6.75mm

Vertical surface movement = 0.10%

Delta V = 0.10% x 4500 = 4.5mm

Lh = 4500 x 4 = 18000mm (Distance behind wall to negligible movement).

halstead ASSOCIATES CALCULATION SHEET REF: 16497 2

PROJECT: 7 GREVILLE PLACE, NW6 5JP ENGINEER: J.E REVISION:

ELEMENT: GROUND MOVEMENT ASSESSMENT & PREDICTED DAMAGE CATAGORY DATE: SEP'16 CHECKED:

DETERMINE HORIZONTAL MOVEMENT

delta l = 9mm/7000 = 0.001

TABLE 2.5, CIRIA C580

CATEGORY OF DAMAGE	NORMAL DEGREE	LIMITING TENSILE STRAIN %
0	NEGLIGIBLE	0.00% – 0.05%
1	VERY SLIGHT	0.050% – 0.075%
2	SLIGHT	0.075% – 0.150%
3	MODERATE	0.150% – 0.300%
4 to 5	SEVERE TO VERY SEVERE	> 0.300%
5		

∴ ANTICIPATED DAMAGE MAY BE CATEGORISED AS "NEGLIGIBLE" – 0.00% – 0.05%

(Continued)

$\frac{\varepsilon_h}{\varepsilon_{lim}} = 1 \quad \therefore \varepsilon_h = 0.05$ for $\varepsilon_{lim} = 0.05$

From fig. 2.18(c):

$\frac{\Delta}{L} = 0.001$

Horizontal strain = 0.05

} Category 0 damage

2) Wall A–C 5.8m long

	Dist. from excavation	Deflection	
Point A	1.7m	$9 \times \frac{16.3}{18}$	= 8.2mm
@ 1.45m	3.15m	$9 \times \frac{14.85}{18}$	= 7.4mm
@ 2.9m	4.6m	$9 \times \frac{13.4}{18}$	= 6.7mm
@ 4.35m	6.05m	$9 \times \frac{11.95}{18}$	= 6mm
@ 5.8m	7.5m	$9 \times \frac{10.5}{18}$	= 5.2mm

By inspection, Wall A–C is not the worst case scenario.

→ check movement to 32 Greville Road – to be read in conjunction with annotated plan 16497/GMA1

1) Wall A–B 8.5m long
1.7m from new basement

From P.01/02, horizontal movement at face of basement wall is 9mm, reducing to zero at 18m (conservatively)

	Dist. from excavation	Deflection
Point A	1.7m	$9 \times \frac{16.3}{18}$ = 8.2mm
@ 2.125m	1.7m	$9 \times \frac{16.3}{18} \times 0.5$ = 4.1mm
@ 4.25m	2.8m	$9 \times \frac{15.2}{18}$ = 7.6mm
@ 6.375m	4.7m	$9 \times \frac{13.3}{18}$ = 6.7mm
Point B	6.8m	$9 \times \frac{11.2}{18}$ = 5.6mm

From Fig. 2.18, Δ is the relative movement along the length of the wall.

As a conservative approach, use the worst case total movement (8.2mm)

$$\frac{\Delta}{L} = \frac{8.2}{8500} = 0.001$$

ϵ_{lim} for "negligible" movement = 0.05%

$$\therefore \frac{\Delta/L}{\epsilon_{lim}} = \frac{0.001}{0.05} = 0.02$$

for $\frac{L}{H} = \frac{8500}{8500} = 1$, $\frac{\epsilon_h}{\epsilon_{lim}} = 1$

Query No	Subject	Query	Status	Design team comments 23/08/16
5	Stability	Neighbouring property foundations not determined and the response provided is contradictory (see Audit paragraph 4.6 and 4.12).	Open- Clarification is requested. Neighbouring foundations to be established or maximum differential depth assumed.	To categorically define the foundations on the adjacent property, intrusive investigation would be necessary which would need to be agreed as part of the Party Wall Agreement. However it is noted that a BIA carried out for a nearby property of similar age and construction / type, has been previously accepted by Camden Council. That BIA made various assumptions regarding foundations. Previous basement work done to our study site didn't damage any of the neighbours' foundations. It is therefore considered that, given that these works will not be immediately adjacent to neighbouring structure, the works would not affect the adjacent properties (Please see attached Schneider Designers new drawings APL-101 and APL-305).
7	Stability	No estimates of ground movement and structural impact presented (see Audit paragraph 4.11).	Open- to be provided	Please refer to Section 4.00 and 5.00 of submitted Structural Feasibility Report_Aug 16.
9	Stability	Damage category for neighbouring properties not provided (see Audit paragraph 4.12)	Open- Anticipated movements from all construction activities to be provided together with damage category for neighbouring properties.	Please refer to Section 5.00 of submitted Structural Feasibility Report_Aug 16.
10	Stability	Movement monitoring proposal not provided (see Audit paragraph 4.14)	Open- Outline proposal to be provided. Details and trigger levels to be agreed as part of Party Wall awards.	Please refer to Section 6.00 and 8.00 of submitted Structural Feasibility Report_Aug 16.

List of documents submitted with this BIA queries response D2:

Revised Information:

- APL-101_Proposed Site Plan R1 – To replace APL-101_Proposed Site Plan submitted on the 16/03/16
- Structural Feasibility Report_Aug 16 – To replace Structural Feasibility Report submitted on the 16/03/16

New Information:

- APL-305_Distances Section – Section showing distances to neighbouring properties

halstead ASSOCIATES

7 GREVILLE PLACE

LONDON

NW6 5JP

STRUCTURAL FEASIBILITY REPORT

PREPARED FOR

MR N RAVEENDRAN

Ref: 16497/DO/mf

Date: August 2016

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CONTENTS

1.00 BRIEF

1.01 The Structural Engineering design brief was to produce a feasibility study into the construction of a new basement extension to an existing three storey semi-detached house at 7 Greville Place, London NW6. The existing house has a full footprint basement and the proposed works will extend the basement to the front and side of the existing layout.

1.02 This Report is to be read in conjunction with Halstead Associates Drawing Nos. 16497/PL01, PL02 and PL03.

1.03 This report is also to be read in conjunction with Jomas Geotechnical Study Ground Investigation and Basement Impact Assessment, reference P939372J779, dated 11 February 2016.

2.00 SCREENING

2.01 Structural Stability Screening Assessment

1.	Does the proposed basement involve underpinning of the existing building?	Yes
2.	Does the proposed basement extend lower than the party fence structure to the right?	Yes
3.	Does the proposed basement extend lower than the building structure to the right?	Yes
4.	Does the proposed basement extend lower than the party fence structure to the left?	Yes
5.	Does the proposed basement extend lower than the building structure to the left?	Yes
6.	Does the proposed basement undermine the public highway?	Yes

3.00 SITE INVESTIGATIONS

3.01 A desk study and associated site based geotechnical investigation was carried out in January 2016 by Jomas Associates Ltd which incorporated two boreholes (4m and 9m deep) and a ground water monitoring point within one of the boreholes.

3.02 The boreholes revealed a narrow band of made ground of up to 0.5m in thickness at shallow level. Below this level firm to stiff brown slightly gravely clay was recorded in both boreholes to their full depth.

3.03 Ground water levels were found to be approximately 1.8m below ground level within borehole WS1 during a return visit to the property. However, it is expected that the water is that which has accumulated within the monitoring installation via run off from the clay surface, or alternatively has been trapped within pockets within the clay. The water is expected to be limited in volume and to be very slow to recharge.

4.00 BASEMENT FORMATION

4.01 Given the proximity to adjacent properties and to the back of the public footpath to the front of the property, it is expected that the walls of the new basement extension will be formed in an underpinning type sequence. This will involve carrying out local excavations of around 1m in width and down to the formation level of the new basement, followed by the fixing of reinforcement within the excavations and the casting of concrete to form an individual retaining wall section complete with base.

The sequencing of this work would be such that no more than 20% of a single wall elevation would be excavated at any given time. At the required excavation depth, suitable shoring would be required to provide a safe working area for site operatives. Typical sequencing for the excavation of a wall section is shown on Drawing No. 16497/PL03.

4.02 At the expected depth required for the excavation, it is likely that temporary shoring to the retaining wall sections will be required in the short term in order to prevent overturning and/or sliding, until the basement slab has been installed. The slab will then act to brace the perimeter walls against the existing building.

4.03 Whilst it has not been established at this stage, it is possible that underpinning of the existing walls to the house directly adjacent to the new basement will be required in order to achieve the new slab levels. Again, this will be carried out in a sequence whereby the extent of the excavation on a single wall line will be limited to 20% of the length of the wall at any one time.

Ideally, this underpinning will be carried out with access gained from the existing basement, therefore limiting the depth of the excavation. However, it is likely that preference will be not to disturb the existing slab and tanking to the basement and as a result the works may need to be carried out externally.

4.00 **BASEMENT FORMATION (Cont'd)**

This would require a much deeper excavation but can be achieved on the basis that suitable shoring is provided in line with good practice.

4.04 Once the basement slab and perimeter walls are fully in place, along with intermediate supporting columns and walls, then the ground floor slab can be cast. This will take support off the existing wall of the building with the use of recessed reinforced concrete pockets into the masonry.

4.05 At 3-3.5m depth down to formation level, it is not expected that the recovery of the load consolidating clays would be significant. Notwithstanding, an allowance is to be made within the design of the basement slab for theoretical heave pressures.

4.06 The Contractor will provide a method statement prior to commencement of work on site in which full details of hours, site set up and method for the formation of reinforced and under reinforced underpinning sections will be detailed. Drawing No. 16497/PL03 shows as indicative sequence for the construction of RC retaining wall "underpin" sections.

5.00 GROUND MOVEMENT & PREDICTED DAMAGE CATEGORY

5.01 Any ground works pose an elevated risk to adjacent properties. The proposed works undermines the adjacent property along the Party Wall line.

5.02 It is not expected that any cracking will occur during the works. However, our experience informs us that there is a risk of movement to the neighbours.

5.03 To reduce the risk to the development:

- Employ a reputable firm for extensive knowledge of basement works.
- Employ suitably qualified Consultants. Halstead Associates have extensive experience with basement constructions.
- Design the underpins to be suitably propped during construction until permanent props are in place.
- Provide method statements for the Contractors to follow.
- Investigate the ground, now completed.
- Record and monitor the external properties. This is completed by a condition survey under the Party Wall Act before and after the works are completed.

5.04 The maximum level of cracking anticipated is Hairline cracking which can be repaired with decorative cracking and can be repaired with decorative repairs. Under the Party Wall Act damage is allowed (although unwanted) to occur to a neighbouring property as long as repairs are suitably undertaken to rectify this. To mitigate this risk the Party Wall Act is to be followed and a Party Wall Surveyor will be appointed.

5.00 GROUND MOVEMENT & PREDICTED DAMAGE CATEGORY (Cont'd)

5.05 Burland Scale:

Extract from The Institution of Structural Engineers "Subsidence of Low-Rise Buildings"

Classification of visible damage to walls with particular reference to type of repair and rectification consideration.

Category of damage	Approximate crack width	Limiting tensile strain	Definitions of cracks & repair types / considerations
0	Up to 0.1	0.0 – 0.05	HAIRLINE – Internally cracks can be filled or covered by wall covering and redecorated. Externally, cracks rarely visible & remedial works rarely justified
1	0.2 to 2	0.05 – 0.075	FINE – Internally cracks can be filled or covered by wall covering, and redecorated. Externally, cracks may be visible, sometimes repairs required for weather tightness or aesthetics. NOTE: Plaster cracks may, in time, become visible again if not covered by a wall covering.

6.00 MONITORING

6.01 In order to safeguard the existing structures during underpinning and new basement construction movement monitoring is to be undertaken.

Monitoring Level Proposed	Type of Works
Monitoring 1 Visual inspection and production of condition survey by Party Wall Surveyors at the beginning of the works and also at the end of the works.	Loft conversion, cross wall removals, insertion of padstones Survey of LUL and Network Rail tunnels. Mass concrete, reinforced and piled foundations to new build properties.
Monitoring 2 Visual inspection and production of condition survey by Party Wall Surveyors at the beginning of the works and also at the end of the works. Visual inspection of existing Part Wall during the works. Inspection of the footing to ensure that the footings are stable and adequate.	Removal of lateral stability and insertion of new stability frames. Removal of main masonry load bearing walls. Underpinning works less than 1.2mm deep.
Monitoring 3 Visual inspection and production of condition survey by Part Wall Surveyors at the beginning of the works and also at the end of the works. Visual inspection of existing Party Wall during the works. Inspection of the footing to ensure that the footings are stable and adequate. Vertical monitoring movement by standard optical equipment.	Lowering of existing basement and cellars more than 2.5m. Underpinning works less than 3.0m deep in clays. Basements up to 2.5m deep in clays.

6.00 MONITORING (Cont'd)

Monitoring 4 Visual inspection of production of condition survey by Party Wall Surveyors at the beginning of the works and also at the end of the works. Visual inspection of existing Party Wall during the works. Inspection of the footing to ensure that the footings are stable and adequate. Vertical monitoring movement by standard optical equipment. Lateral movement between walls by laser measurements.	New basements greater than 2.5m and shallower than 4m deep in gravels. Basements up to 4.5m deep in clays. Underpinning works to Grade I Listed Building.
Monitoring 5 Visual inspection of production of condition survey by Party Wall Surveyors at the beginning of the works and also at the end of the works. Visual inspection of existing Party Wall during the works. Inspection of the footing to ensure that the footings are stable and adequate. Vertical & lateral monitoring movement by theodolite at specific times during the project.	Underpinning works to Grade I Listing Building. Basements to Listed Building. Basements deeper than 4m in gravels. Basements deeper than 4.5m in clays. Underpinning basements to buildings that are expressing defects.
Monitoring 6 Visual inspection of production of condition survey by Party Wall Surveyors at the beginning of the works and also at the end of the works. Visual inspection of existing Party Wall during the works. Inspection of the footing to ensure that the footings are stable and adequate. Vertical & lateral monitoring movement by electronic means with live data gathering. Weekly interpretation.	Double storey basements supported by piled retaining walls in gravels and soft sands (N<12).

6.00 MONITORING (Cont'd)

Monitoring 7 Visual inspection of production of condition survey by Party Wall Surveyors at the beginning of the works and also at the end of the works. Visual inspection of existing Party Wall during the works. Inspection of the footing to ensure that the footings are stable and adequate. Vertical & lateral monitoring movement by electronic means with live data transfer.	Larger multi-storey basements on particular projects.
Monitoring Conclusion	
Monitoring 4 Visual inspection of production of condition survey by Party Wall Surveyors at the beginning of the works and also at the end of the works. Visual inspection of existing Party Wall during the works. Inspection of the footing to ensure that the footings are stable and adequate. Vertical monitoring movement by standard optical equipment. Later movement between walls by laser measurements.	New basements greater than 2.5m and shallower than 4m deep in gravels. Basements up to 4.5m deep in clays. Underpinning works to Grade I Listed Building.

6.02 Before the works begin a detailed monitoring report is required to confirm the implementation of the monitoring. The items that this should cover are:

- Risk Assessment to determine level of monitoring
- Scope of Works
- Applicable Standards
- Specification for Instrumentation
- Monitoring of existing cracks
- Monitoring of movement

6.00 MONITORING (Cont'd)

- Reporting
- Triggering Levels using a RED AMBER GREEN system

Recommended levels are:

Movement	Category	Action
0mm – 5mm	Green	No action required.
5mm – 12mm	Amber	Crack monitoring: Carry out a local structural review. Preparation for the implementation of remedial measures should be required.
>12mm	Red	Crack monitoring: Implementation of structural support as required. Cease works with the exception of necessary works for the safety and stability of the structure and personnel. Review monitoring data and implement revised method of works.

7.00 WATERPROOFING

7.01 As this form of construction will not allow external damp proofing systems to be employed, it is envisaged that the Architect will opt for a proprietary drained cavity system to line the external face of the retaining wall and slab. Any inflow of ground water which may result would then be directed to an internal sump and then pumped as necessary into the surface water system.

8.00 PARTY WALLS

8.01 Given the proximity of adjacent buildings, Party Wall Agreements may be required with neighbouring home owners, particularly in light of the recommendations for monitoring during the works.

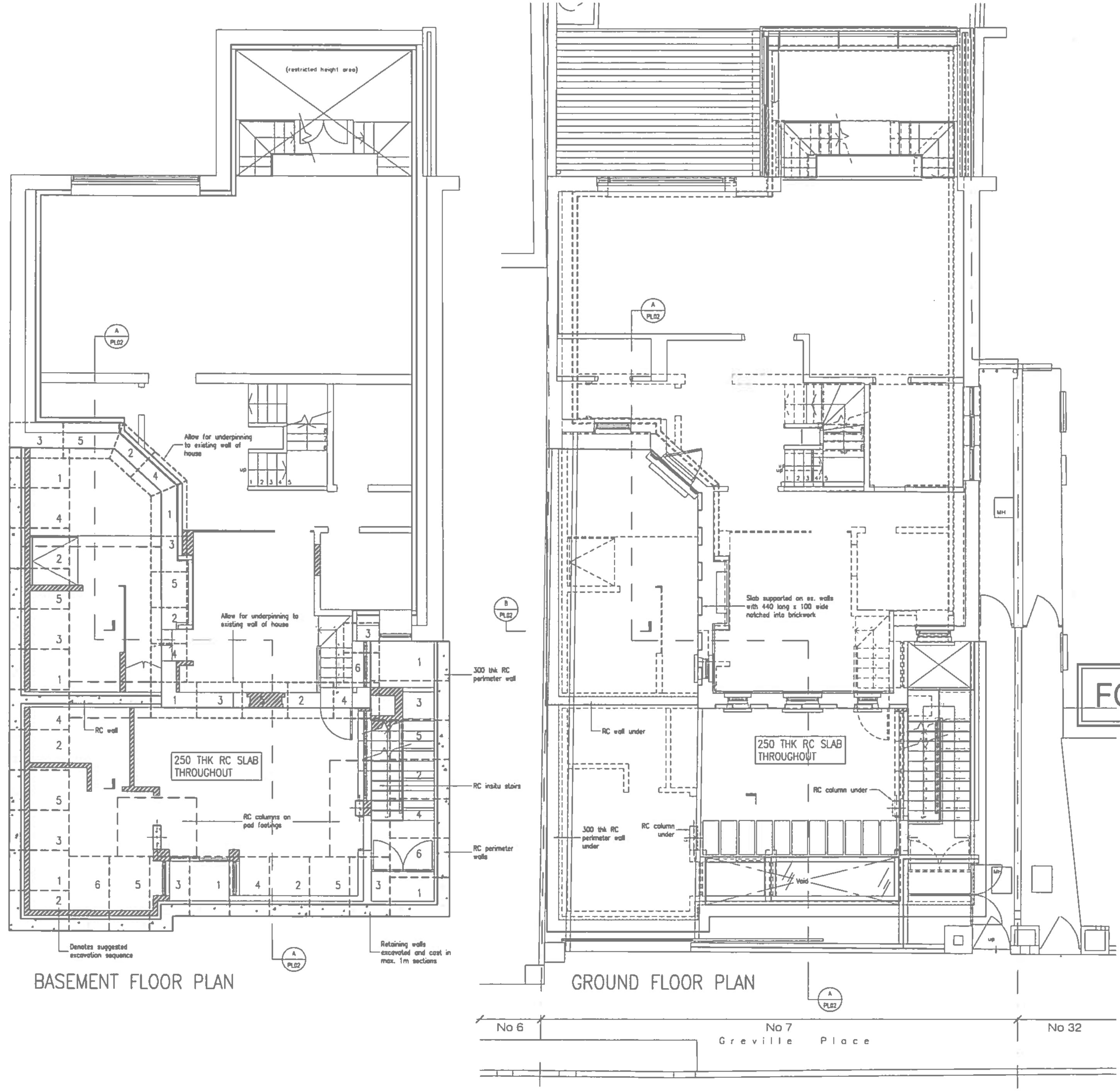
9.00 TEMPORARY WORKS

9.01 A competent Contractor, experienced in this form of residential basement construction must be used, and a Temporary Works Coordinator should be employed to ensure that the stability of the ground and adjoining buildings is maintained though out the construction process.

David Oates CEng BEng (Hons) MIStructE

APPENDIX A

Halstead Associates Drawing Nos. 16497/PL01, PL02 and PL03A.

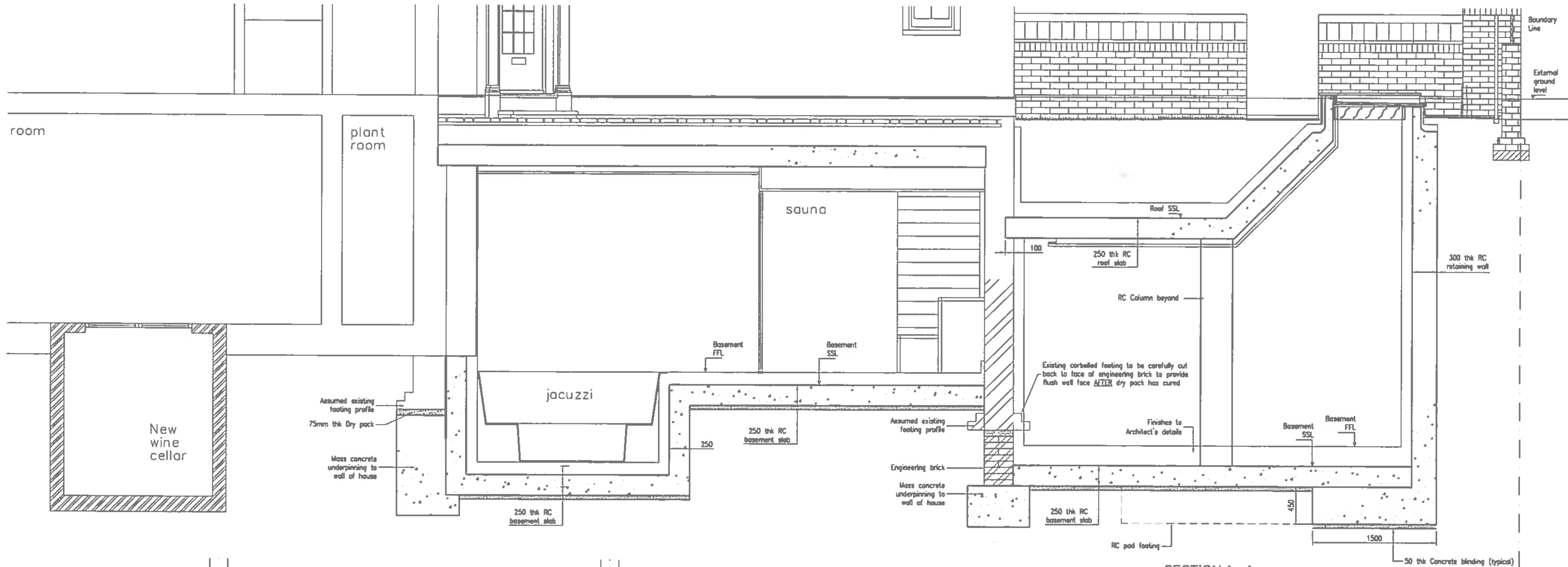


FOR INFORMATION ONLY

Notes:
1. The drawing is to be read in conjunction with all relevant Consultant's drawings and specifications.

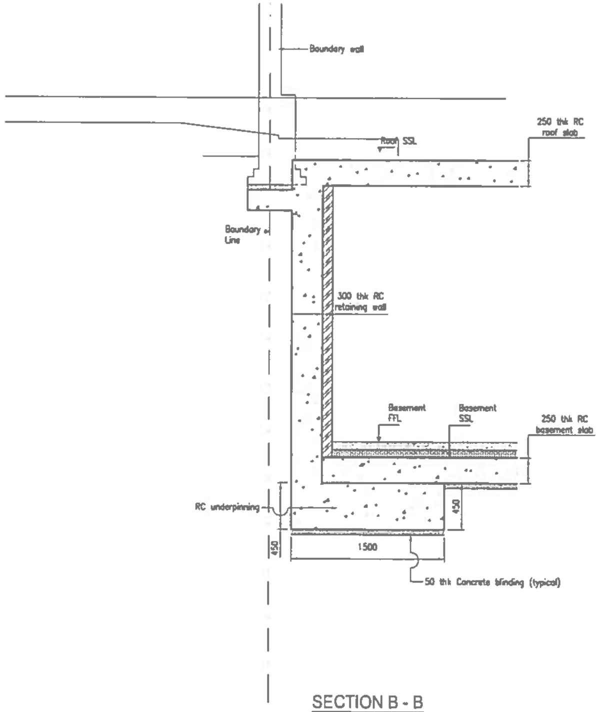
Rev.	Date	Revisions	By	Engineer

Project: 7 GREVILLE PLACE, NW6 5JP	Drawn by: JK
Title: GA BASEMENT AND GROUND FLOOR PLANS	Checked by: DO
Client: Mr N Raveendran Architect: Schneider Designers	Date: 26th February 2016
halstead associates construction consultants	Scale: 1:50 @ A1
	Drawing No: 16497/PL01



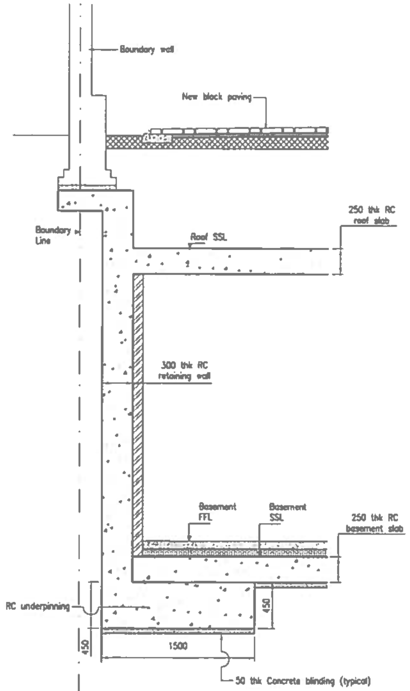
SECTION A - A

SCALE 1:25



SECTION B - B

SCALE 1:25



SECTION C - C

SCALE 1:25

DPC, FINISHES AND WATERPROOFING TO ARCHITECT'S DETAILS

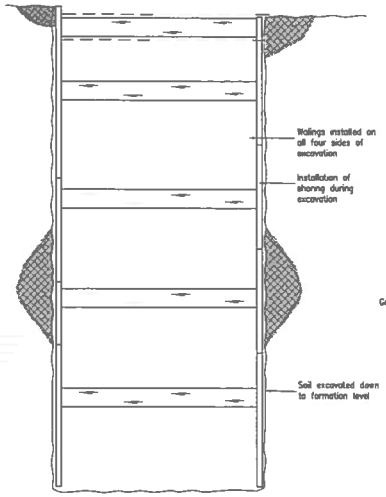
FOR INFORMATION ONLY

Notes:
1. The drawing is to be read in conjunction with all relevant Consultant's drawings and specifications.

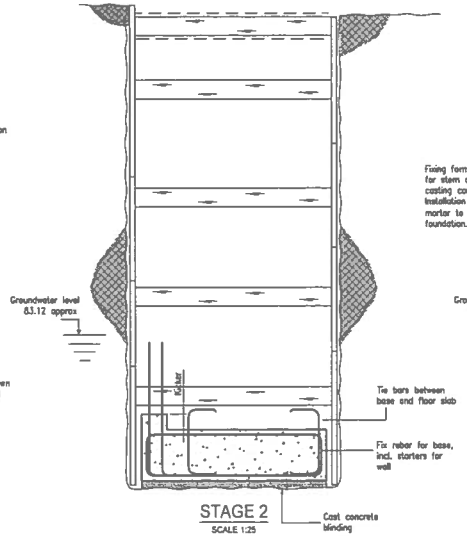
Rev.	Date	Revisions	By	Engineer

Project:	7 GREVILLE PLACE, NW6 5JP	Drawn by:	JK
Title:	STRUCTURAL SECTIONS	Checked by:	DO
Client: / Architect:	Mr N Raveendran / Schneider Designers	Date:	26th February 2016
		Scale:	AS NOTED @ A1
		Drawing No:	16497/PL02

halstead ASSOCIATES CONSTRUCTION CONSULTANTS



STAGE 1
SCALE 1:25



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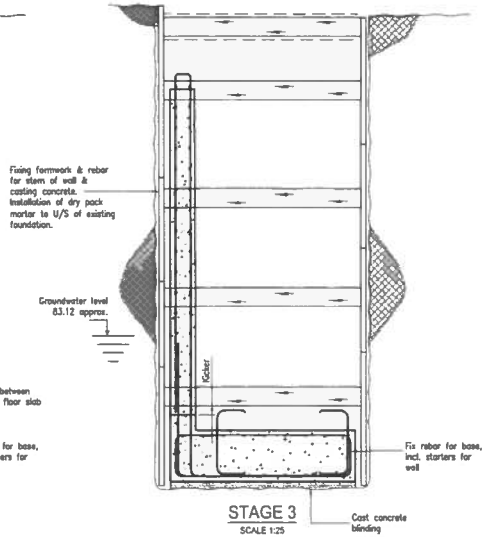
SCALE 1:25



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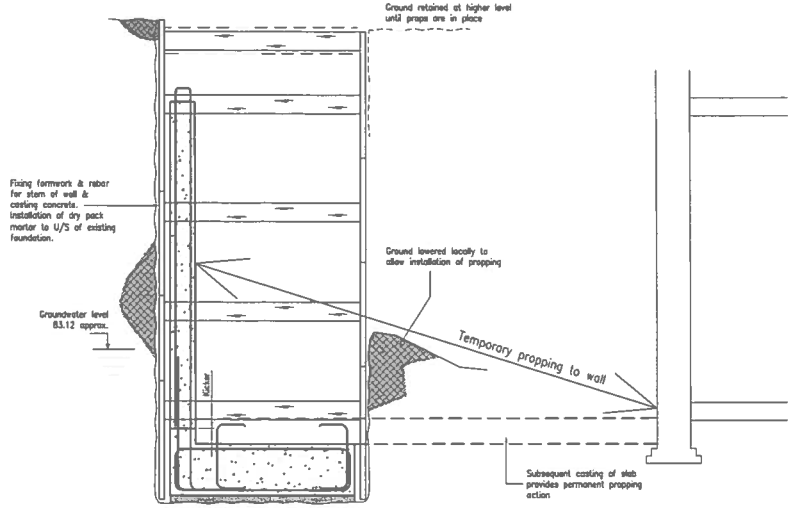

STAGE 4 ONWARDS
SCALE 1:25

FOR INFORMATION ONLY

Rev.	Date	Revisions	By	Engineer
A	20.07.16	Further sequencing information added.	DO	

Notes:
1. The drawing is to be read in conjunction with all relevant Consultant's drawings and specifications.

Project:	7 GREVILLE PLACE, NW6 5JP
Title:	SUGGESTED CONSTRUCTION SEQUENCING FOR RETAINING WALL SECTIONS
Client:	Mr N Raveendran
Architect:	Schneider Designers
Drawn by:	JK
Checked by:	DO
Date:	26th February 2016
Scale:	AS NOTED @ A1
Drawing No:	16497/PL03
	A

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